

# A Comprehensive National Energy Policy Based On Integrated & Advanced Renewable Energy Systems and Citizen Cooperative Land Ownership

Presented by Equitech International, LLC - A Consortium of Twenty-Three Sister Companies  
Headed by Former Leaders of Georgetown University and NASA Jet Propulsion Lab

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prepared by Smart Future, LLC (St. Louis, MO) and Solution Factory Consulting (Murphysboro, IL)

## Phase 1: The Model

Equitech International, LLC (EI, LLC) and Metro East Citizens Land Cooperative (MECLC) propose to implement Phase 1 of a Comprehensive National Energy Policy, through the implementation of two innovations of national significance; 1) integration of two proven advanced renewable energy systems into one stand alone emission-free power plant and manufacturing center, the E-Macrosystem, and 2) a for-profit community investment corporation (citizen land cooperative), providing increased access to capital and expanded ownership of productive assets, for the benefit of citizen-shareholder owners.

The proposed initial MECLC Model E-Macrosystem facility will enrich every household while meeting the needs of Metro East's eleven communities\*, by being a national exemplar of an integrated means of (1) converting the area's municipal, medical, pharmaceutical, toxic, chemical, industrial,

biomass and sewage waste into clean hydrogen, potable water, medical oxygen and numerous other beneficial by-products using a renewable energy system that operates without releasing carbon dioxide into the atmosphere, and (2) distributing ownership shares and governance rights in land, basic infrastructure and infrastructure profits into every household in the exemplar area as a fundamental right of citizenship.

The advanced renewable energy innovation is proposed for construction in an East St. Louis Phase 1 national demonstration model that can be replicated and exported via the region's Mississippi River ports (the Mississippi's northernmost ice-free ports) to other ports anywhere in the world. The partners have manufacturers ready to build replications of the demonstration immediately. Implementation of this exemplar will be followed by E-Macrosystem and Solar Fuel Cell Regeneration [SFCR] manufacturing facility rapid deployment in Phase 2 through Phase 4 to meet the increasing demand for advanced renewable energy system components worldwide.

[Phase 1 continued on page 5]

## Value Propositions:

[See inside for more details]

- Emissions-free waste processing.
- Emissions-free clean energy production.
- Complete carbon sequestration.
- Decentralization of electrical grid / distributed renewable energy.
- Prioritization of National Security.
- Major economic driver / job creator.
- Citizen ownership of revenue-producing assets.

The mission of Equitech International, LLC is to answer Buckminster Fuller's challenge:

"We are called to be the architects of the future, not its victims... [Our challenge is to] make the world work for 100% of humanity in the shortest time possible through spontaneous cooperation without ecological offense or the disadvantage of anyone." - R. Buckminster Fuller



\* The 11 Illinois riverfront communities of the Metro East Citizen's Land Cooperative include: Alorton, Brooklyn, Cahokia, Centreville, East St. Louis, Fairmont City, Granite City, Hartford, Madison, Venice and Washington Park.



EQUITY EXPANSION  
INTERNATIONAL, INC.

Solar Electric Light Fund



WHITING-TURNER



*Consortium of Twenty-Three Companies  
United In Creating The Most Advanced &  
Integrated Renewable Energy Systems:*

**SOME OF THE PARTNERS INCLUDE:**

Metro East Citizen's Land Cooperative  
– EAST ST. LOUIS, IL

**COL (Ret) Mike Morrow**, CEO  
**Mayor Alvin Parks** (ESL), President

Center for Economic and Social Justice  
& Equity Expansion International  
– WASHINGTON, DC

**Norman G. Kurland**, President

**SOME OF THE MEMBERS INCLUDE:**

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# What Is The E-Macrosystem?

Developed by Equitech International, LLC, the E-Macrosystem is the combination of an emissions-free 7.5 MW Waste Steam Reforming System [WSRS] Power Plant and a 720 kW Solar Fuel Cell Regeneration [SFCR] Manufacturing Center sharing a specially augmented 105,800 square foot facility that will provide up to 160 MWh of Premium Energy per day to the grid via the WSRS, while supporting the manufacture of advanced renewable energy system components for nationwide and worldwide export with 4,100 kWh of Premium Energy per day for the facility's tenants via the SFCR system.

**E-Macrosystem**  
*As viewed from the southeast.*

For research purposes and to begin the process of commercializing its invention, EI, LLC will share in ownership of the first model E-Macrosystem with MECLC. EI, LLC is owned by former leaders of NASA Jet Propulsion Laboratory (JPL), along with master architectural / engineering, design science, research & development, telecommunications, construction management and marketing companies. This wide breadth and depth of the EI, LLC consortium is essential for EI, LLC to be a turn-key master architectural / engineering support firm that packages projects as joint ventures in partnership with local professionals and contractors-as-professionals of record to implement such a comprehensive and large-scale projects as the E-Macrosystem.

Along with being a stand alone emission-free power plant, a state-of-the-art advanced renewable energy research and manufacturing facility, and an integration of two proven advanced renewable energy systems, the E-Macrosystem offers the following:

- Premium Power capable of being either independent of, or linked to, the electrical grid. Capable of supporting battery-powered "plug-in" vehicles. Key technology in decentralization of the electrical grid.
- Supports energy needs in rural and remote locations. Tremendous upside for military utilization.
- Can be mobile, including marine capabilities when replicated on a ship. (When unique systems patent is commercialized, ships can be moved from port-to-port using the two technologies of the national exemplar / model project.)
- Can be applied to reduce the costs of penal systems by enabling prisoners to produce marketable components and profits for victim restitution, family support, prison operations and related enterprises in the communities in which they locate.
- Has been proven to have tunnel-safe transport implications through the use of its methanol water fuel cell regeneration system—no threat in tunnels, non-combustible.

## Solar Fuel Cell Regeneration

The Solar Fuel Cell Regeneration [SFCR] manufacturing facility is a 105,800 sq. ft complex that serves as a research and manufacturing center for advanced renewable energy systems. The basic solar regenerative fuel cell power system consists on solar photovoltaic (PV) arrays, the electrolyzer subsystem, the fuel cell subsystem with reactant storage tanks, and thermal management / electrical power management subsystems.

The basic system operates as follows: When the sun shines, the solar PV arrays not only put out enough DC power to satisfy the daytime loads, but also to supply power to the electrolyzer subsystem which dissociates water and stores the resulting hydrogen and oxygen in storage tanks. During the night, when the solar arrays are inactive, the fuel cell subsystem is turned on to supply the required nighttime loads. Of course the water is stored and later separated back into its hydrogen and oxygen constituents by the solar-powered electrolyzer during the next daylight portion of the cycle. Therefore, the basic solar regenerative fuel cell power system does not require any supply of external fuel to operate its fuel cells. The sun is the only source of external energy required.

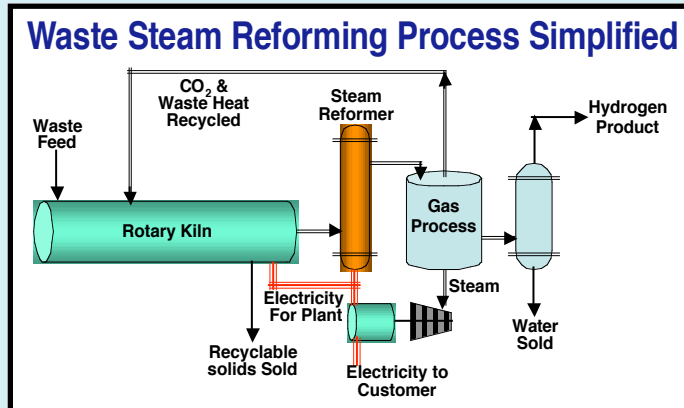
# Waste Steam Reforming System

The Waste Steam Reforming System is a part of an advanced and integrated renewable energy system developed and patented by Equitech International, LLC and its consortium of twenty-three companies, which feature top energy, design, and research & development leaders from NASA/JPL and several world class universities and research facilities.

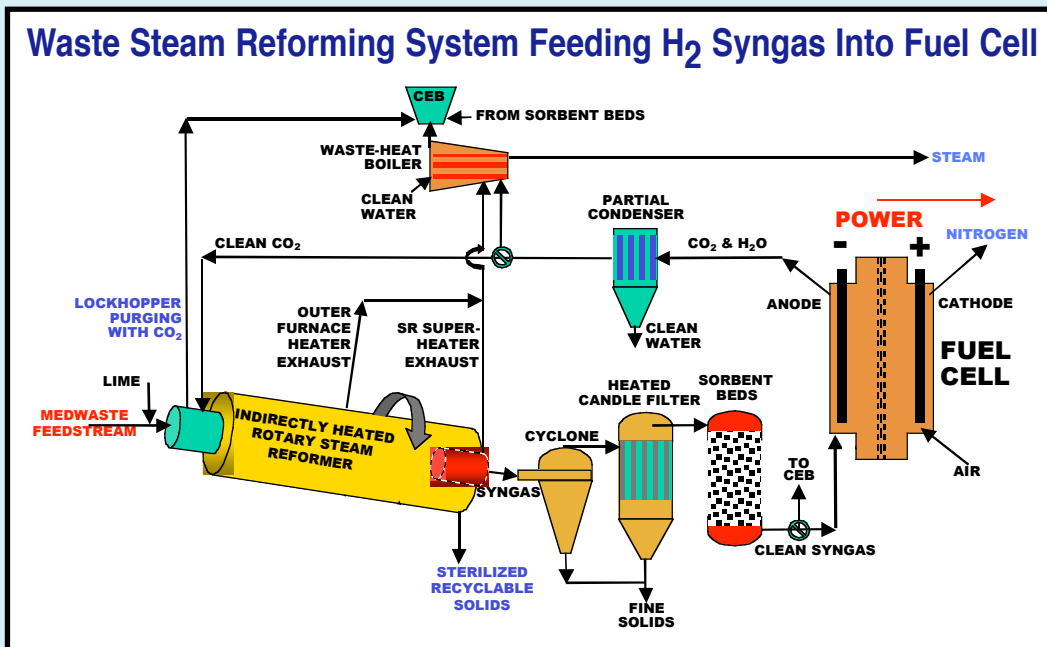
The Waste Steam Reforming System is a *non-incineration* waste-to-energy system that is uniquely capable of processing any sort of waste feedstream (including municipal waste, sewage sludge, toxic waste, chemical waste, pharmaceuticals, hospital waste, infectious / pathological medical waste, agricultural waste, biomass, etc.) via chemical reduction into a clean H<sub>2</sub>-rich syngas, CO, CO<sub>2</sub>, H<sub>2</sub>O steam, and other marketable commodities (medical oxygen, potable water, methanol) depending on the composition of the feedstock. The Waste Steam Reforming System vaporizes organic liquids and gasifies organic solids through the utilization of indirect heat and the introduction of superheated steam and CO<sub>2</sub>, causing the breakdown of all molecular bonds and converting toxic organic matter into non-toxic inorganics.

No harmful emissions are produced with this technology, as any CO<sub>2</sub> emitted from the anode of the syngas-fed solid-oxide fuel cell is recycled and utilized to supply the endothermic heat and CO<sub>2</sub> needed to drive the steam reforming chemical reactions. The remaining carbon is sequestered as an inert and sterile residue, suitable as fill for construction materials, or can be sequestered into other marketable hydrocarbon commodities. The linkage of steam reformation with fuel cells produces clean, reliable and efficient electrical energy, heat, and steam. The Waste Steam Reforming System is a truly comprehensive, co-generative, cradle to cradle ecosystem solution in that it:

- Can process any waste input (besides dirt) without utilizing incineration or combustion.
- Removes all toxins from the waste feedstock without creating any harmful emissions.
- Is an extremely efficient method of extracting energy from many different types of organic materials, and has widespread applications as a clean waste disposal technique.
- Creates a clean H<sub>2</sub>-rich syngas, ideal for powering fuel cells and providing premium power.
- Is a highly efficient method for carbon sequestration, without risky underground injection.
- Outputs marketable commodities, including potable water, medical oxygen and various other hydrocarbon byproducts (depending on the feedstock).



## Waste Steam Reforming System Feeding H<sub>2</sub> Syngas Into Fuel Cell



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# Proofs of Concept

## Multi-agency consortium Solar Fuel Cell Regeneration Program achieved a \$30 million proof of concept at Edwards Air Force Base, California in 1995

The NASA Jet Propulsion Lab invited Georgetown University to join them in developing a large consortium of many U.S. and Canadian federal agencies, university, private entities, the California Air Quality Management District and California Institute of Technology, which manages JPL for NASA. The consortium was formed to set up a test-bed for a Solar Fuel Cell Regeneration proof of concept at Edwards Air Force Base, California. NASA/JPL's commission was to create a sustainable stand-alone base on the moon (lunar colony). NASA/JPL sought the collaboration and help of Georgetown University as they discovered that the University was developing a sustainable stand-alone master energy plan called "NEICES" (National Exemplar Integrated Community Energy System) that included the University's fuel cell bus program funded by the Federal Transit Administration and led by the General Motors design engineer for the moon buggy.

The tests were eminently successful proving the system can work continuously "24/7" no matter when the sun shines; thus the system provides premium power and it is clean and quiet. Georgetown contributed to the \$30 million total cost and was able to test the SFCR application of its NEICES program over an 8-year period (1987-95) while its 300 kW academic building was being completed.

## Intellergy / Westinghouse Waste Steam Reforming System achieved a \$24 million proof of concept at Oak Ridge, Tennessee in 1995

Meanwhile, almost simultaneously, the second proof of concept for advanced steam reforming was being carried out by Intellergy and Westinghouse at Oak Ridge, TN. This innovation also was an overwhelming success with years of testing completed before the new owners (Duratek), who purchased the system, sold it to the Japanese. The system is still in operation processing one ton of waste per day. The system proved its merits, cleanly converting medical, pharmaceutical, toxic, all biomass, and hazardous wastes at 2,000 degrees Fahrenheit without any combustion, and miniscule amounts of clean residue. The cost of the WSRS proof of concept was approximately \$24 million.

## Other Investments to Date

The Advanced Vehicle Department of Georgetown University was co-founded by EI, LLC's chairman in 1983, and still develops Heavy Duty Fuel Cell Buses (30 and 40 foot) for FTA. The first 30 foot HD Fuel Cell Bus was delivered April 14, 1994.

4 This was the first liquid fueled system of methanol and water for hydrogen production on board. The total invested in the pro-

gram from 1983 to 1995 was \$21 million.

Additionally, EI, LLC's chairman also developed and implemented the first ever 300 kW integrated solar photovoltaic academic building on the Georgetown University campus. It was developed as a National Exemplar Integrated Community Energy System (NEICES), and received a total investment of \$23 million.

# Patents and Intellectual Property Protection:

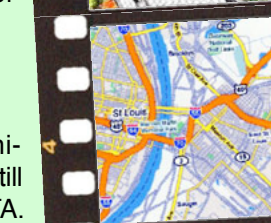
A number of patents protect the systems and processes invented and designed by EI, LLC and its various sister companies.

The original patent for the steam reforming chemistry protected the process and equipment used to create syngas from organic material. For this protection, the U.S. Patent Office issued what is called a "basic" patent for the chemistry. This patent was then extended to cover the use of all greenhouse gases (carbon dioxide, methane, etc) in the steam reforming process. Added to these protected properties were patents focused on the use of the syngas and its conversion to various eco-products: hydrogen, biodiesel, ethanol additives, paraffins that sequester carbon, "green" electricity, and fertilizer, through the use of a variety of devices.

Some of these patents include: "Process and system for converting carbonaceous feedstocks into energy without greenhouse gas emissions," "Systems and utility modules for buildings," "Method and system for removal of harmful heteroatoms in gaseous waste streams," "Hazardous waste reactor system," "Systems and utilities modules for buildings", and patent pending "Process and system for converting biomass materials into energy to power marine vessels."



Steam reforming of wastes on Mars  
Two ton per day steam reformer system  
300 kW Georgetown University solar building  
Fuel cell hybrid bus Georgetown University



ARES Office Building  
Synthetica steam reformer  
E-Microsystem Apartments  
Map of Metro East, IL

# Steps Toward A Comprehensive National Energy Policy

## Phase 1 - The Model *(continued)*

East St. Louis, IL has experienced a prolonged unemployment rate of 23%, and overall the poverty rate is 31% in the eleven Metro East communities, making this region the ideal proposed model site. This national exemplar will demonstrate the integrated technology that produces all power from all forms of waste and the sun, advanced renewable energy system component manufacturing, robust job creation and broad citizen ownership of productive assets utilizing the mechanism of Community Investment Corporations. \$70 million in Federal Stimulus funding is required to cover the cost of this first E-Macrosystem, which has total projected net revenue of \$30 million per year. This will be achieved through the sale of green Premium Power to the grid (demanded by the pharmaceutical and computer chip industries, among others), potable water, medical oxygen, clean hydrogen, methanol, paraffins, other carbonaceous products and through the emissions-free disposal of medical and hazardous industrial waste.

The turnkey project is ready for final design and construction under the professional oversight of Equitech International, LLC and Whiting Turner Construction Company on land provided by the City of East St. Louis and the ten surrounding communities through the for-profit Metro East Citizens Land Cooperative on behalf of all residents, the MECLC shareholders. This first E-Macrosystem will create in the range of 2,100 jobs, 200 full-time and part-time temporary construction jobs (with expected two year duration), 300 full-time permanent jobs (after all phases off ramp-up are complete), and 1,600 regional / national enhancement job opportunities (including public services, agriculture, forestry, medical, retail, general services and manufacturing of component parts outside of the region).

Part B of Phase 1, the E-Microsystem model research and development project, will be launched 6 months following the completion the MECLC E-Macrosystem. The \$80 million needed to create this prototype 50 unit affordable-housing apartment complex, utilizing a one ton per day 100 kW WSRS in conjunction with a smaller scale SFCR system to process all waste/sewage and provide all energy, will be acquired through federal or private loans. This E-Microsystem project will create in the range of 700 jobs, 150 full-time and part-time temporary construction jobs, 100 full-time permanent jobs, and 450 regional / national enhancement job opportunities.

## Phase 2 - Commercialization

Phase 2 will consist of the construction of 23 E-Macrosystems at key locations of need throughout the United States. Due to economy of scale, the average cost each E-Macrosystem will be \$50 million, making the total capital requirement for this Commercialization Phase \$1.15 billion in Federal Stimulus funding. Total job creation is projected to be 48,300, while net revenue will be \$690 million per year.

## Phase 3 - Implementation

Phase 3 marks the establishment of industrial parks, which will be completed through the addition of three SFCR facilities to E-Macrosystem sites. All SFCR's will be constructed such that they can accommodate being retrofitted to become E-Macrosystems through the addition of a WSRS, which will require about 15,000 sq. ft. of space from the SFCR.

## PHASE 1 – THE MODEL

### Metro East Citizen's Land Cooperative

#### PART A – MECLC E-Macrosystem, \$70 million FED. STIMULUS

To be located in East St. Louis, Illinois, the first E-Macrosystem National Exemplar will be constructed (\$60 million) once the Final Design (\$5 million for Program of Requirements & Design Build Engineering) is complete. \$5 million will launch the MECLC.

#### PART B – E-Microsystem Model Research & Development,

**\$80 million LOAN PROGRAM** for model 50 unit affordable-housing apartment complex, utilizing a one ton per day 100 kW WSRS in conjunction with a smaller scale SFCR system. System will process all waste and sewage, while meeting all complex energy needs. Project to start 6 months after realization of Phase 1, Part A, expected to require 14 months for completion.

## PHASE 2 – COMMERCIALIZATION

### 23 E-Macrosystem Replication Projects

23 E-Macrosystems - **\$1.15 billion FED. STIMULUS**. At an average of \$50 million each to be strategically located and constructed in areas of greatest need near key distribution avenues.

## PHASE 3 – IMPLEMENTATION

### 300 E-Macrosystem Replication Projects & 86 SFCR Manufacturing Facilities

#### PART A – 300 E-Macrosystems - \$12.0 billion FED. STIMULUS

At \$40 million each, the 300 additional E-Macrosystems are to be distributed throughout all 50 states, each planned to serve regions with 100,000 to 160,000 people.

#### PART B – 13 SFCR Manufacturing Facilities - \$390 million

**LOAN PROGRAM**. Three SFCR manufacturing facilities at \$30 million each added to original MECLC E-Macrosystem site to complete model 20-acre, 4-building industrial park, along with one additional SFCR facility at \$30 million each placed in each of the 10 remaining Illinois riverfront communities that comprise the MECLC.

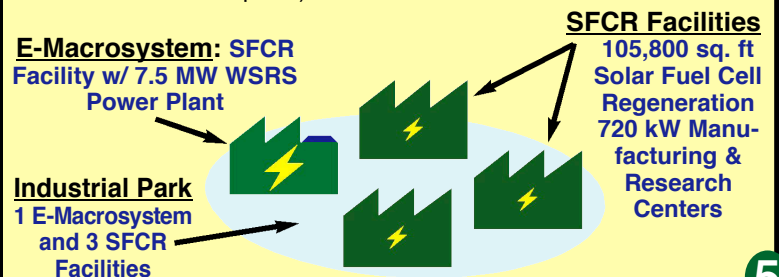
#### PART C – 69 SFCR Manufacturing Facilities - \$2.07 billion

**FED. STIMULUS**. 69 SFCRs at \$30 million each (three for each of the 23 Commercialization "Phase 2" E-Macrosystem sites to complete 20-acre industrial parks).

## PHASE 4 – FINAL COMMERCIALIZATION

### 900 SFCR Manufacturing Facilities

900 SFCR Manufacturing Facilities - **\$27.0 billion LOAN PROGRAM**. 900 SFCRs at \$30 million each (three for each of the 300 Implementation "Phase 3" E-Macrosystem sites to complete 20-acre industrial parks).



All SFCRs are also expandable modular systems that can multiply their total space while maintaining the same footprint, adding one or more stories at a time.

Phase 3 will consist of the construction of 300 more E-Macrosystems, planned at 6 per state, and 82 SFCR facilities, completing 24 industrial parks while providing a SFCR facility for each of the remaining 10 MECLC communities. Due to economy of scale, the average cost of each E-Macrosystem will be \$40 million, making the total capital requirement for this Implementation Phase \$14.07 billion in Federal Stimulus funding in addition to \$390 million in federal or private loans for all MECLC-related buildings. Total job creation is projected to be 733,200 while net revenue will be \$9.06 billion per year.

## Phase 4 - Final Commercialization

Phase 4 will consist of the construction of 900 more SFCR facilities in the completion of 300 industrial parks. The average cost of each SFCR facility will be \$30 million, making the total capital requirement for this Final Commercialization Phase \$27 billion in federal or private loans. Total job creation is projected to be 1,080,000 while net revenue derived from Premium Energy production (guaranteed "24/7" energy supply) from these SFCR facilities will be \$9.06 billion per year.

allocation that provides every community member with equal access to productive assets and capital credit.

While the Civil Rights Movement guaranteed equal access to the vote, that monumental victory was not followed by its logical and necessary sequel: the Economic Justice Movement, democratizing access to ownership of productive capital. This is revealed by the fact that even though every U.S. citizen of age can vote, the top 1% holds as much wealth as the bottom 95%. In the United States of America, we live in a political democracy engulfed by an economic plutocracy.

The Capital Homestead Act is a solution that creates a variety of mechanisms to overcome the oppressive policies and the contrived barriers that most Americans find limit their capacity to freely acquire private property and productive capital assets. This comprehensive strategy reduces poverty in communities and regions selected for E-Macrosystem commercialization sites both through job creation and distribution of the economic benefits. One of these tools for providing equal access to capital credit, transforming capital into a growing revenue stream for truly everyone, is the Community Investment Corporation.

Providing these localized regions with Community Investment Corporations, giving each citizen ownership shares in the means of production, will allow each individual to benefit from the growth in productive corporate assets that occurs through structural improvements and technological innovation. These are processes that result naturally from the development of our free market economy that total nearly \$2 trillion per year in increased assets. In this way, everyone is entitled to purchase some of this new capital generated every year with the earnings it generates over time, instead of just limiting this process to those who are already in possession of tremendous capital assets.

# Citizen Ownership of Revenue-Producing Assets

The focus of the first four phases of this Comprehensive National Energy Policy is to launch a significant number of advanced renewable energy system power stations and manufacturing facilities (E-Macrosystems) to accelerate research and development of advanced renewable energy systems, and to inject a major economic stimulus into areas of need throughout the United States. This economic stimulus takes the form a robust increase in job opportunities, both temporary and permanent, and an approach to asset

# Utilizing Waste For Energy Generation

In addition to major job creation and mechanisms for providing equal access to ownership of productive capital assets, this Comprehensive National Energy Policy's commitment to utilizing the sun and waste for energy production, perhaps our two most abundant resources, will give many communities an opportunity to compete internationally with what have been primarily unseen, or at least unrealized, indigenous resources. Waste comes from a variety of sources, from our own household waste, to sewage sludge, to animal

## Comprehensive National Energy Policy – Costs & Impact

Category ↓	Phase →	Phase 1 The Model	Phase 2 Commercialization	Phase 3 Implementation	Phase 4 Final Commercialization
<b>Initial Capital Required</b>	FED. STIMULUS	\$65 million	\$1,150 million	\$14,070 million	–
	LOAN PROGRAM	*\$80 million	–	\$390 million	\$27,000 million
<b>Revenue Per Year</b>	E-MACROS	\$30 million	\$690 million	\$9,060 million	–
	SFCR FACILITIES	–	–	\$61.5 million	\$675 million
<b>Premium Energy Produced</b>	E-MACROS	** 59.9 GWh/yr	** 1,378 GWh/yr	** 17,970 GWh/yr	–
	SFCR FACILITIES	* 0.8 GWh/yr	–	122.7 GWh/yr	1,347 GWh/yr
<b>Jobs Created</b>	E-MACROS	2,100	48,300	630,000	–
	SFCR FACILITIES	* 700	–	98,400	1,080,000

feedlot waste, to industrial waste (some chemical and toxic), to nature's biomass, and there is almost literally no end to the available tonnage. In fact, when you add up all the sources of waste in the United States, and the feedstreams they create on an annual basis, one realizes that with waste alone there is nearly enough energy to power every household in the U.S. for two years.

Waste is perhaps the only energy source that others will pay one to take. Municipal waste nets between \$25 and \$30 a ton, medical waste brings about \$200 a ton, feedlot waste brings about \$500 a ton, and hazardous industrial waste can range from \$10,000 to \$50,000 per ton. But processing this waste with a methodology that does not further degrade human and environmental health has been an elusive goal. Incineration, which does render these toxic and hazardous materials inert, creates its own brew of poisonous emissions. The steam reforming technological advancement of the E-Macrosystem overcomes the dangerous hazardous emissions consequences of combustion-based waste-to-energy systems through the clean, emissions-free processing of any and all types of waste, no matter how toxic.

The gases that are off-vented from landfills in general consist of 55% methane and 45% carbon dioxide. While they are both considered green house gases, contributing to global warming, the release of methane is considered to be twenty-three times as detrimental to our environment as carbon dioxide. In fact, methane is responsible for 10.6% of global warming damage from human-sources in the United States, and of this, 35.8% of this methane is from landfill gas. Thus, 3.8% of U.S. global warming damage is from methane in landfill gas. That is why the strategy of burning off methane gas via flares is often employed at landfills, transforming it into carbon dioxide, a less detrimental green house gas, but a green house gas nonetheless.

In feedlot stockyards, between five to twenty pounds of volatile organic compounds (VOCs) are emitted annually from one cow, including propyl acetate, hydrogen sulfide, methane and ammonia. These VOCs combine with nitrogen oxides to form ozone, which reduces lung function in humans, triggers asthma attacks, and adds to global warming. A New York study of 38 landfills found that women living near solid waste landfills where gas is escaping have a four-fold increased chance of bladder cancer or leukemia. Further studies have demonstrated that there is a significantly overall increased risk of neural-tube defects, malformations of the cardiac septa (hole-in-the-heart), and malformations of the great arteries and veins in residents that live within two miles of landfill sites. A study by researchers at the London School of Hygiene and Tropical Medicine also found that babies born to mothers who live near landfills have a greater risk of birth defects.

The E-Macrosystem Waste Steam Reforming System can transform this waste, destroying harmful viruses and bacteria, and rendering toxic metals inert. These waste feedstreams are transformed into a steady stream of clean energy, while the carbon in the waste is sequestered into marketable commodities.

## The Distributed Energy Generation Strategy

Initially, E-Macrosystems will focus on the creation of high demand Premium Power to sell through the grid and the production of a number of marketable commodities, including renewable clean hydrogen, potable water, medical oxygen, construction materials, "green" fertilizer,

## Energy Impacts of U.S. Waste Feedstreams

Sector (Origin of Waste)	Total Dry Tons Per Day	Power GWe [Gigawatt Electrical]	Million Tons of Oil Equivalent
Industrial Solid	1,137,000	113.7	219.4
Municipal Solid	962,500	96.3	185.8
Sewage Sludge	157,500	15.7	30.4
Medical	29,000	2.9	5.6
Beef	180,500	18.0	34.8
Poultry	120,655	12.1	23.3
Dairy	13,900	1.4	2.7
Pork / Lamb	11,900	1.2	2.3
<b>Totals</b>	<b>2,612,955</b>	<b>261.3</b>	<b>504.3</b>

and a number of other hydrocarbon and carbonaceous eco-products. In the long term, however, the proliferation of E-Macrosystems will have an even greater impact as distributed centers of energy generation.

The transmission capacity of our centralized electrical grid continues to lag behind demand and will need to increase by more than 10% over the next ten years to meet projected U.S. energy needs. According to the American Society of Civil Engineers, "paltry investment in the aging infrastructure caused transmission capacity to drop 19 percent annually for the decade between 1992 and 2002." David Meyer, former U.S. Department of Energy Senior Policy Advisor, concludes that: "We need to see a very substantial transformation of the [grid] system. We're outgrowing it in many parts of the nation." While it lacks in overall capacity, our current electrical grid system is also deficient in efficiency, with about 6 to 8% of the electricity lost in the form of heat as the wires conduct the current over hundreds of miles. E-Macrosystems decentralize power production to where people actually live, utilizing their indigenous waste assets and the sun for energy generation, where the means of production are owned by them through Community Investment Corporations.

Our current centralized system is thus not only underperforming in terms of capacity and efficiency, but it is also highly susceptible to acts of nature. One need look no further than the "2003 Northeast blackout" to understand the fragility of our centralized electrical grid. The series of events, which led to 50 million people being without power for up to two days, cost up to \$10 billion, and contributed to at least eleven deaths, were set into motion when a high-voltage power line in northern Ohio brushed against some overgrown trees and shut down, failing to set off a FirstEnergy Corporation alarm system. It was the biggest blackout in North American history, all caused by a tree brushing against a power line.

## Prioritization of National Security

Of course, other systematic failures of our completely overloaded and unstable centralized grid played a role in this most costly and tragic blackout, but that is exactly the point: while the United States centralized electrical grid is highly susceptible to unforeseen accidents, it is downright vulnerable to planned acts of sabotage or terrorism. In fact, many military, corporate and government energy leaders consider the current centralized grid to be the number one threat to our national security, with a distributed approach to energy genera-

tion offered in Equitech International's Comprehensive National Energy Policy being the solution.

Because of the highly interconnected and aging infrastructure of the our current electrical grid, major power outages and disruptions are

due to become even more common place, and the potential increases for sabotage or even terrorist attacks with our electrical grid as the target. These concerns are expressed by the Council on Foreign Relations: "Experts say

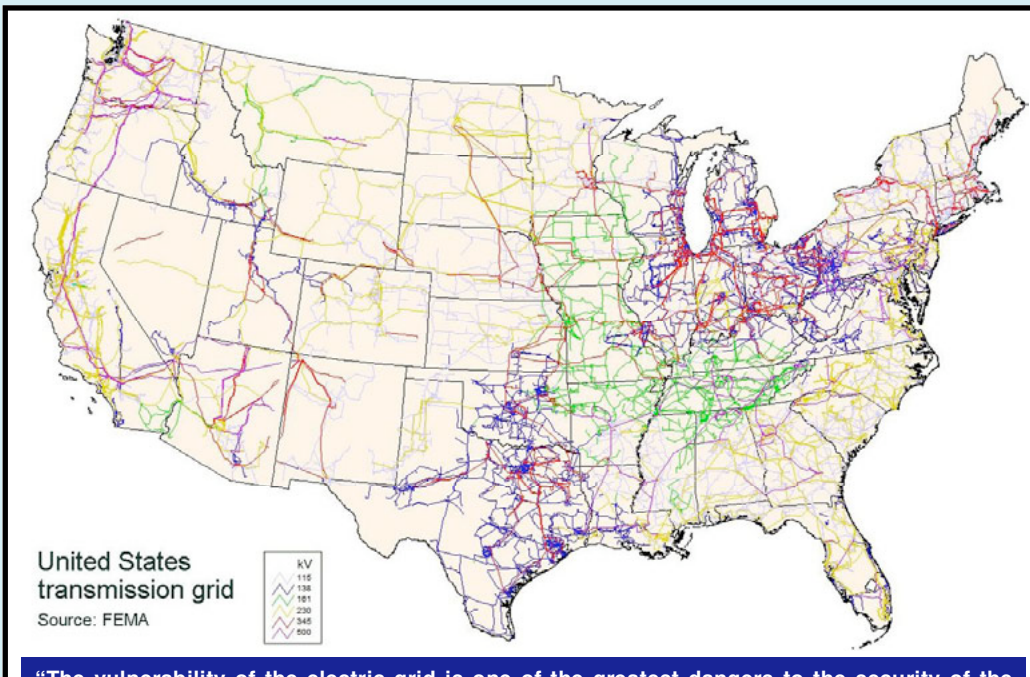
jihadis in Iraq have proven adept at disrupting the electrical grid in that country and could easily apply that same skill set in the United States." Decentralizing power distribution reduces potential disruption due to terrorist attacks on our energy infrastructure, as it would greatly diminish the potential damage from any one node in the interconnected web being hit, while reducing the impact of the overall lack of security that already exists.

The very nature of the centralized electrical grid in the United States, with some 160,000 miles of high voltage lines and 250,000 substations, makes it difficult to protect from any sort of threat, as squirrels are often noted as being the most common cause of power outages. "On any given day, five hundred thousand people in the United States are without power for two hours," indicates Clark W. Gellings, vice president of the Electric Power Research Institute. E-Macrosystems place energy generation at the source of its consumption, minimizing inefficient energy distribution services over long distances, while providing disruption-free Premium Power to companies that simply cannot afford any interference with their constant energy needs.

Another threat to national security is our dependence on foreign sources of energy. Oil accounts for 40% of America's energy consumption, and 58% of America's oil demand is met through foreign imports. These facts squarely place at least partial control of our energy supply outside of our own hands. Locally produced and distributed energy, produced at or close to the source of consumption, is secure energy.

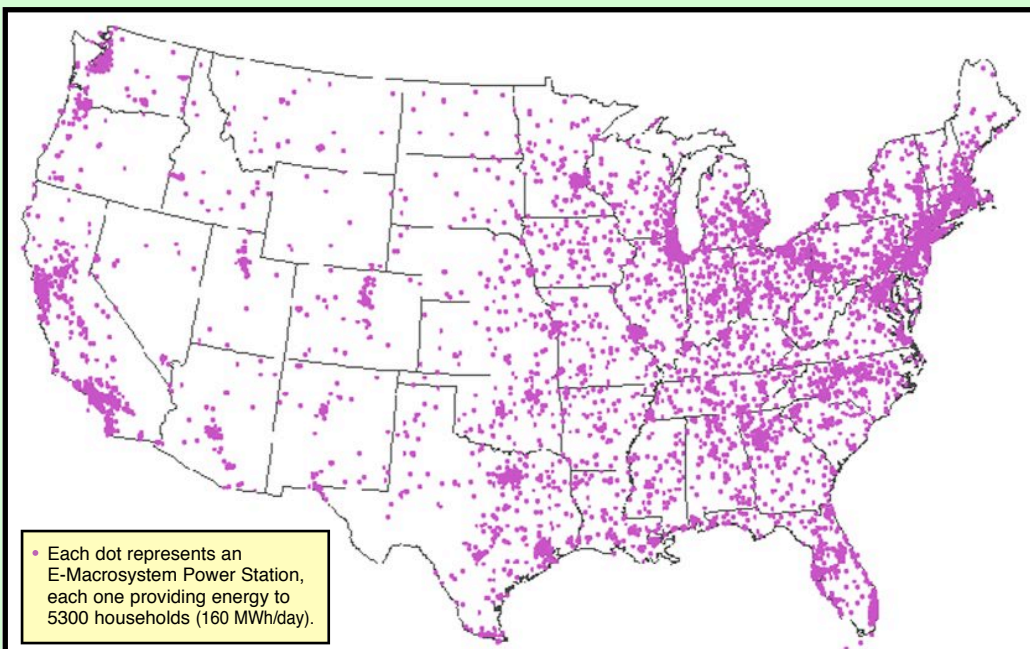
Tens of thousands of smaller, renewable, self-sufficient, sustainable, broadly distributed energy generation centers (i.e. E-Macrosystem power stations) are superior to fewer, larger, vulnerable power production centers. In the United States we literally have all our eggs in one basket, which definitely has not been working to our benefit. In an article entitled "Energy Forever" Amory and L. Hunter Lovins reiterate that, "We can achieve energy security by using less energy far more efficiently to do the same tasks—and then by supplying what is still needed from sources that are inherently invulnerable because they're dispersed, diverse, and increasingly renewable." Equitech International, LLC shares in this vision, a future of distributed power stations, locally situated that are fueled by indigenous, renewable and sustainable energy sources. The citizens of the local community share in the ownership of these productive assets, and share in the benefits that equal access to capital provides.

## United States *Centralized* Electrical Grid (2009)



"The vulnerability of the electric grid is one of the greatest dangers to the security of the country. Not only is the grid vulnerable to physical attacks, it is also increasingly vulnerable to cyber attacks. Indeed, there is a growing sophistication of ability to use cyber attacks to cause damage to physical infrastructure. The vulnerability of the grid is a serious issue especially when one considers that if there were a serious attack on a critical component it could take months—if not years—to recover." — R. James Woosley, former CIA Director

## Projected U.S. *Distributed* Electrical Grid (2030)



"Distributed generation at many locations around the grid increases power reliability and quality while reducing the strain on the electricity transmission system. It also makes our electricity infrastructure less vulnerable to terrorist attack, both by distributing the generation and diversifying the generation fuels. So if you're engaged in this effort, it is my view that you are also engaged in our national effort to fight terrorism." — David Garman, former U.S. Assistant Secretary of Energy